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Geology of the

Dickison Lake Area

District of Thunder Bay

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By
M. W. Carter

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GEOLOGICAL MAP

(back pocket)

Map 2293 (coloured) – Dickison Lake, District of Thunder Bay. Scale, 1 inch to 1 mile [1:63,360].

ABSTRACT

This report describes the geology and mineral deposits of the Dickison Lake area defined by Latitudes 49°02'00"N and 49°20'00"N and Longitudes 87°07'30"W and 87°45'00"W. The area comprises about 590 square miles (1530 km²) and is centred on Dickison Lake, approximately 105 air miles (169 km) northeast of the city of Thunder Bay.

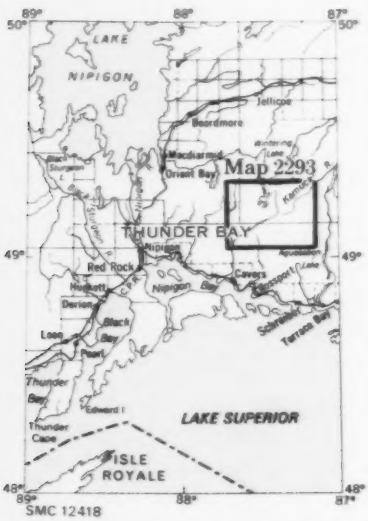

Figure 1–Key map showing location of Dickison Lake area. Scale, 1 inch to 50 miles (1:3 168,000).

Bedrock in the area belongs to the Archean and Proterozoic subdivisions of the Precambrian. The Archean rocks are arenaceous metasediments, migmatized metasediments, granite, and minor metamorphic mafic and ultramafic rocks. The metasediments are derivatives of greywacke, arkose, and arenite; the granitic rocks are regarded as derived by anatectic and intrusive processes. The migmatitic rocks are quantitatively the most important and were derived by granitization of the arenaceous rocks. The metamorphic mafic and ultramafic rocks were probably derived from igneous rocks. Proterozoic rocks are represented by minor diabase and quartz diabase dikes. Faulting is a characteristic feature of the area; faults trending northwesterly are best developed.

Amethyst is being produced in the area from the Little Bear Mine owned by T. Galarneau at Kabamichigama Lake. Chalcopyrite is the most important metallic mineral found in the area and it is associated with the northwesterly faults.

Geology of the Dickison Lake Area District of Thunder Bay

By

M. W. Carter[1]

INTRODUCTION

Location

The Dickison Lake area lies to the southeast of Lake Nipigon in the Thunder Bay Mining Division, District of Thunder Bay, northwestern Ontario. The nearest towns are Nipigon to the southeast, Beardmore to the northwest, Geraldton to the northeast, and Terrace Bay to the southeast. Centred on Dickison Lake the area is approximately 105 air miles (169 km) northeast of the city of Thunder Bay. The area mapped is bounded by Latitudes 49°02′00″N and 49°20′00″N and by Longitudes 87°07′30″W and 87°45′00″W, and is about 590 square miles (1530 km²) in extent.

Means of Access

The eastern and western parts of the area are accessible by the Kimberley-Clark of Canada Limited and Domtar Limited road networks, respectively. The Kimberly-Clark road connects Terrace Bay with Geraldton by an unsurfaced, all-weather gravel road. It links Highway 17 in the south with Highway 11 in the north and is used to supply the Kimberly-Clark Camp No. 58 at Duet Lake. Branch roads from it provide access in east-west directions within the map-area. The western part of the area may be reached by the Domtar all-weather gravel road from Highway 17 at Kama Bay. This road is used to serve Domtar Camp No. 81 on the Jackpine River. A branch from this serves the area as far as 4 miles (6.4 km) beyond Kabamichigama Lake.

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[1]Geologist, Precambrian Geology Section, Geological Branch, Ontario Division of Mines. Manuscript approved for publication by the Chief Geologist 17 January 1972.

Dickison Lake Area

Water access to the area would be via Gravel River and Pays Plat River. Canoe travel up these rivers is by way of Gravel, a flag stop on the Canadian Pacific Railway, or from Pays Plat, another flag stop about 10 miles (16 km) east of Gravel. Using the latter route one can travel to Dickison Lake via Greenhedge Lake but numerous portages will be encountered.

Air access is best for the central part of the area. Chartered float-equipped aircraft may be obtained from Thunder Bay, Pays Plat, Jellicoe, or Geraldton. The shortest route is from Pays Plat.

Physiography

The area is rugged with a maximum relief of 700 feet (210 m); precipitous cliffs are a common feature in the west, central, and southern parts. Many of these scarp slopes are fault scarps. The topography is subdued only in the far northern part of the area. Ridges have an east to northeast direction in the hilly areas, reflecting the major structural trends of the rock formations. Bedrock is abundant in such areas. In regions of subdued relief the area is covered by glacial ground moraine deposits.

The dominant physiographic feature is a steep-walled trench up to 200 feet (60 m) wide, with sheer walls up to 500 feet (150 m) high, which reflects the Gravel River-Kamuck River Fault. This fault trends northeast across the entire map-area for a distance of 34 miles (55 km) dividing it symmetrically. Numerous waterfalls precipitate over the cliff faces of the trench, but the most spectacular is that where the Gravel Lake-Skewer Lake chain of lakes enters the Gravel River north of Dickison Lake.

The height-of-land straddles the map-area with the main rivers draining either towards Hudson Bay or into Lake Superior. The Gravel, Pays Plat, and Aguasabon River systems drain southwards into Lake Superior. The Long Lake system drains northeastward into Hudson Bay via the Kenogami River and the Albany River.

Previous Geological Work

The first geological work in the area was carried out in 1901 by W. A. Parks (1901). On this survey, canoe examinations of the upper reaches of the West Gravel River from Croon Lake (Little Croon Lake) to Kabamichigama Lake (Abamichegomog Lake), and of the Cypress and lower reaches of the Gravel River, were made. The results of this work are shown in part on Compilation Map 8A (Lake Nipigon) published by the Geological Survey of Canada at a scale of 1 inch to 4 miles (1:253,440) (A. W. G. Wilson 1910), and on Compilation Map 964 published by the Geological Survey of Canada at a scale of 1 inch to 8 miles (1:506,880) in 1907 (Collins 1905; 1909; W. J. Wilson 1909). In 1905, W. H. Collins (1905) made river traverses of the Pays Plat and Gravel Rivers and the results of this work are shown on Map 964 of the Geological Survey of Canada in both the 1907 and 1911 editions. In 1917, T. L. Tanton (1917) examined the geology of the area traversed by the then Canadian Northern Railway between Nipigon and Longlac, including all the prin-

cipal water routes made accessible by the railway. This work included areas in the northern part of the Dickison Lake area. Compilation Map 1836 was prepared by Tanton (1921) which included this work and which was published by the Geological Survey of Canada in 1921 at a scale of 1 inch to 4 miles (1:253,440). This map was subsequently reissued in two parts in 1934 incorporating minor additions: Map 312A, Sturgeon River area at a scale of 1 inch to 2 miles (1:126,720), and Map 313A, Little Long Lac area at a scale of 1 inch to 2 miles (1:126,720). Later, in 1920, T. L. Tanton (1920) carried out field work in an area between Port Arthur and Schreiber and between Latitude 49°10′N and the north shore of Lake Superior. This survey included traverses run in various directions from near the headwaters of Whitesand River and the country between this river and Nickel Lake. The results of this work are shown on Ontario Department of Mines Map 30a (Hopkins 1921). No further surveys were undertaken until 1939 when M. W. Bartley (1940) mapped the geology of the Big Duck-Aguasabon Lakes area for the Ontario Department of Mines. This area included country between Rope Lake and Stingray Lake southeast of Dickison Lake. Map 49k at a scale of 1 inch to ½ mile (1:31,680) accompanies the report. Following this, mapping was again undertaken in the area by M. W. Bartley (1955a, b) in 1954 and 1955 in the vicinity of Dickison Lake and the upper reaches of the Gravel River, respectively. These two surveys were carried out on behalf of Canadian Pacific Limited. The two reports are accompanied by maps at a scale of 1 inch to ¼ mile (1:15,840). No further geological mapping was undertaken until the present mapping by the Ontario Division of Mines in 1970.

Present Geological Work

Field work for this project was carried out during the summer of 1970 using vertical aerial photographs at a scale of 1 inch to ¼ mile (1:15,840) supplied by the Ontario Division of Forests. Pace-and-compass traverses were run at intervals of ¼ mile to 1 mile (0.4 to 1.6 km) depending on the nature of the geology. Such traverses were restricted mostly to areas underlain by metasediments. Much of the region underlain by the granite-migmatite complex was mapped by helicopter. The geological data were plotted directly on the acetate sheets attached to the aerial photographs and were then transferred to the 1 inch to ¼ mile (1:15,840) cronaflex base maps compiled by the Cartography Section of the Ontario Division of Lands, from Forest Resources Inventory maps of the Silviculture Section of the Ontario Division of Forests. Preliminary Map P.690 (Carter 1971) published in June 1971 at a scale of 1 inch to 1 mile (1:63,360), gives the geology of the entire area.

Acknowledgments

During the field work the author was assisted by P. S. Daly and P. A. Maynes, senior assistants, and by D. J. Anderson, A. F. Bau, C. W. Krajewski, and P. R. Robertson, junior assistants. Both senior assistants did independent mapping in the area.

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The author would also like to thank P. S. Broadhurst of Zenmac Metal Mines Limited, Grant L. Puttock of Kimberley-Clark of Canada Limited, and E. A. Smith of Domtar Woodlands Limited for their co-operation in providing maps showing the location of private roads in the area, and P. S. Broadhurst for permitting a visit to the closed Zenith Mine.

GENERAL GEOLOGY

Bedrock in the map-area belongs to the Archean and Proterozoic subdivisions of the Precambrian.

The oldest rocks are metasediments which are for the most part migmatized. They are predominantly of the sandstone family consisting mainly of greywacke with minor arkose and arenite. Argillaceous rocks are subordinate. All these rocks were classified as Coutchiching-type by Bartley (1955, p.4). They have been metamorphosed under almandine-amphibolite facies conditions of regional metamorphism. Their major structural feature is a northeast- and east-trending regional foliation and gneissosity which, however, in the southeastern part of the map-area have a southeast trend. The metasediments and the migmatites derived from them form part of the Quetico Belt, a subprovince of the Superior Province (Stockwell 1964; Ayres 1969).

After their formation the sedimentary rocks were intruded by mafic igneous rocks now occurring as irregular masses, but in one area as a dike. Metamorphism has converted these to amphibolites (plagioclase amphibolites, olivine amphibolites, and pyroxene amphibolites). The amphibolites are dark, dense, heavy rocks, mostly massive, but locally showing a poorly developed foliation. Quantitatively they are unimportant. It is believed that these rocks were metamorphosed at the same time as the sediments.

Pervasive migmatization followed the general metamorphism and affected the metasediments, but some sections of the metasedimentary unit were unaffected and are preserved as irregular remnants. Identification of migmatite areas was based on the occurrence of megascopic interpenetration-deformation structures involving granitic and metasedimentary parts as indicated by Mehnert (1968, Figures 1a, 1b, p. 10-11). In this way, unmigmatized metasediments were separated from migmatite and granite. Migmatite was thus mapped as a unit and subdivision was made according to the nature of the leucosomatic (light coloured) part of the neosome (newly

Table 1 | TABLE OF LITHOLOGIC UNITS FOR DICKISON LAKE AREA

CENOZOIC

QUATERNARY

Recent and Pleistocene

Glacial drift, gravel, sand, and silt

Unconformity

PRECAMBRIAN

LATE PRECAMBRIAN (PROTEROZOIC)

LATE MAFIC INTRUSIVE ROCKS

Diabase, quartz diabase

Intrusive Contact

EARLY PRECAMBRIAN (ARCHEAN)

FELSIC IGNEOUS AND METAMORPHIC ROCKS

Felsic Igneous Rocks

Biotite granite, garnetiferous biotite granite, white and pink pegmatite with minor aplite (garnet, biotite, tourmaline), grey biotite granite, pink pegmatite with magnetite, hornblende-biotite granite, muscovite granite, biotite-muscovite granite, quartz monzonite, mylonitized syenite porphyry.

Contact Gradational

Migmatites

Metasedimentary migmatite with biotite ± hornblende granite, metasedimentary migmatite with granite and pegmatite leucosome, metasedimentary migmatite with pegmatite and aplite leucosome

Contact Indeterminate

MAFIC AND ULTRAMAFIC ROCKS

Plagioclase amphibolite, olivine amphibolite, pyroxene amphibolite

Contact Indeterminate

METASEDIMENTS

Biotite-quartz-feldspar schist, garnet-biotite-quartz-feldspar schist, hornblende-quartz-feldspar schist, biotite-quartz-feldspar gneiss, biotite-hornblende-quartz-feldspar gneiss, greywacke (garnet) blasto-mylonite, cataclasite, phyllonite, quartzite, arkose, garnet arenite, phyllite

formed part of the rock) as suggested by Mehnert (1968, p.231-233). This method of presentation also accords with the mapping of lithologic units and both parts of the migmatite can be indicated with one code. The leucosomatic material consists of granitic, pegmatitic, and aplitic rock matter which may contain garnet, tourmaline, magnetite, and biotite.

Granitic rock bodies are abundant in the area, ranging in composition from granite to quartz monzonite. A biotite granite, which appears white in the field, is the most abundant rock type in the northern half of the area, whereas a hornblende granite, which appears red, is common in the southwestern part of the region. The granitic rocks were identified by their massive granular texture. By using this definition (Raguin 1965, p.1) granite was thus separated from foliated and gneissic migmatite or 'granite-gneiss'. Granitic areas are thereby outlined irrespective of whether they were derived by anatexis or by allochthonous diapiric intrusion. By separating granite from migmatite, the former can be indicated in migmatite terrain and this would facilitate the study of mineralized granite plutons. All the granitic masses, except one body which straddles the Gravel River-Kamuck River Fault in the vicinity of Dickison Lake, have gradational contacts with the migmatite. These are regarded as anatectic granites. The granite near Dickison Lake, however, is intrusive, displaying sharp discordant contacts. It is considered to be post-migmatite in age. It is a pink, porphyritic rock containing much muscovite. The anatectic granitic bodies display large areas consisting of pink granite pegmatite. These contain magnetite crystals up to ¾ inch (2 cm) across.

Intrusive into all these rock units are dikes of diabase. They follow both a northeast and a northwest trend. Only those following the northwest trend and emplaced in faults are important. These are the dikes intrusive into the Croon Lake-Dinkin Lake Fault and into the Eastbourne Lake-Hall Lake Fault. Although the emplacement of the diabase is post-faulting, the diabase itself is also shattered indicating later movement on the faults. The diabase is considered Proterozoic in age.

The dominant structural feature of the area is faulting which occurred at three periods. The earliest set of faults is a northwest-northeast set, the northwest faults being the better developed. The second period of faulting produced the dominant structural feature of the area, the northeast-trending Gravel River-Kamuck River Fault which traverses the entire map-area diagonally and divides it symmetrically. The latest faulting gave rise to minor north-northwest-trending faults.

Mineralization is spatially related to the northwest faults which were the earliest formed.

Unconsolidated deposits are Pleistocene and Recent and consist of till, sand, and gravel. Pleistocene deposits are best developed near the north-central boundary of the area and also near the east-central border.

Early Precambrian (Archean)

METASEDIMENTS

The metasediments comprise massive and foliated greywacke, mylonitized greywacke, arenite, phyllite, biotite-quartz-feldspar schist, biotite-quartz-feldspar gneiss, and amphibole-feldspar-quartz gneiss. The greywacke derivatives are best exposed

in the Dickison Lake area; the arenite derivatives in the southeastern part of the area between Rope Lake and Aguasabon River.

The greywacke is the most important unit quantitatively. It is grey to dark grey, fine to medium grained, and colour banded in light and dark grey. Metamorphism has destroyed primary features, however, and it could not be shown that the colour banding is primary. Foliation is indicated by the parallel alignment of biotite. The texture of the rock is granoblastic. The typical greywacke is composed of biotite, 5 percent; quartz, 5 percent; feldspar, 89 percent; and pink garnet occurring in some rocks. Where the foliation is well developed, the rock is schistose.

In the migmatite, this same greywacke occurs as the palaeosome and it may be either massive or schistose and is dense and fine grained. A typical example is a microfoliate rock consisting of 54 percent albite, 25 percent biotite, 10 percent hornblende, 10 percent quartz, and accessory apatite, opaque minerals, and zircon. Pleochroic haloes can be seen in the biotite when it contains zircon. The greywacke bands in the migmatite vary from 1 inch to 12 inches (2.5 to 30 cm) in width.

Associated with the greywacke is a dark, fine-grained, megascopically massive or foliated rock consisting of amphibole and feldspar. These units are minor and are not mappable at the field scale of 1 inch to ¼ mile (1:15,840). A section cut from this rock type shows hornblende, having a characteristic green-yellow pleochroism, 75 percent; plagioclase, 15 percent; quartz, 7 percent; and accessory biotite, opaque minerals, and zircon. Because of its close field association with the greywacke, this rock is included in that unit on Map 2293 (back pocket).

Gneisses are associated with migmatite. These gneisses are homogeneous and coarse grained and contain appreciable feldspathic material but segregation of the mineral constituents into bands of different texture and composition has not taken place. Two types occur. One is a black and white rock consisting of black amphibole, biotite, and white feldspar. A rude gneissosity is present and can be seen by the unaided eye. In thin section, it is seen to consist of: feldspar, 35 percent (oligoclase, 25 percent; microcline, 10 percent); hornblende, 12.5 percent; biotite, 12.5 percent; quartz, 10 percent; and accessory zircon, opaque minerals, apatite, and epidote. The second type is light coloured and consists of white and pink feldspar and biotite. Gneissose texture is visible and a typical thin section consists of feldspar, 76 percent (plagioclase, highly altered, 56 percent; altered alkali-feldspar, 20 percent); biotite, 12 percent; quartz, 10 percent; and accessory apatite, zircon, and opaque minerals.

Mylonitized greywacke forms a sufficiently distinctive and wide unit to be shown on the map. It is associated with the Gravel River-Kamuck River Fault, occurring on its southeastern side where the fault crosses the greywacke. Blastomylonites, cataclasites, and phyllonites are present. The mylonites are very fine-grained massive rocks deceptively resembling felsic, intermediate, and mafic volcanic rocks in the field. They vary from grey to almost black and are megascopically structureless flinty rocks. In thin section the mylonitic texture is very well developed, the rock consisting of broken elongated relict grains of approximately 25 percent quartz, some of which is streaked out and set into a matrix of sericitized feldspar comprising 67 percent of the rock. The quartz and sericitized feldspar are associated with 5 percent chlorite and accessory biotite, opaque minerals, and epidote. The phyllonites show well developed cleavage and the characteristic silky sheen of muscovite. Well-developed cleavage planes are apparent. In some of these rocks the cleavage planes are filled with quartz. In thin section the cleavage planes are clearly visible with the quartz (25 percent), occurring as broken lensoid fragments set in a sericitized

feldspar matrix (48 percent), containing 25 percent muscovite and biotite with accessory tourmaline, opaque minerals, and epidote.

In the southern part of the map-area in the vicinity of the Nickel Lake-Rope Lake system of lakes, an arenitic facies of the sedimentary sequence is well developed. It comprises arkose and quartzite, which are pale white and pale yellow, sand textured, with virtually no clay-size admixture. They are fine grained and have been recrystallized. Some have colour banding, whereas others are massive. A specimen which clearly indicates its arenite parentage contains 90 percent quartz, 5 percent plagioclase feldspar, 2 percent garnet, and 3 percent of combined biotite and chloritized biotite. Other varieties contain considerable feldspar and are arkoses. A thin section from a banded arkose contains 12 percent quartz, 82 percent feldspar (mostly sericitized, but with some unaltered microcline), 5 percent biotite, and accessory apatite and opaque minerals. In another specimen, garnet and tremolite are present in amounts up to 20 percent of the rock. The arenites grade into rocks in which a granitic component is present as irregular bands. The juxtaposition of both the metasedimentary and the granitic parts can be seen in the field. A thin section shows the fine-grained metasedimentary part to consist of a granoblastic quartz-feldspar mosaic containing minor biotite, and the granitic component to consist of 35 percent quartz, 35 percent feldspar (perthite, microcline, and acid plagioclase), 15 percent biotite, 10 percent amphibole (hornblende), 3 percent muscovite, and accessory calcite, apatite, and opaque minerals.

Phyllites are not very abundant but are best developed at Squawk Lake in the extreme northwestern part of the area. They are dark medium-grained rocks showing well developed schistosity. The characteristic silky sheen of the micas on the cleavage planes can be seen. The rocks are dark grey and consist of muscovite, quartz, and biotite. The low content of quartz as compared with the greywackes indicates their derivation from a more pelitic facies of the metasedimentary unit.

MAFIC AND ULTRAMAFIC ROCKS

Mafic and ultramafic rocks occur sporadically in the area as small bodies and are quantitatively insignificant. They occur as irregular lensoid and dike-like bodies associated with the arenite unit in the Nickel Lake-Rope Lake area and the migmatitic rocks continuous with this unit to the east. The largest mass is on the southern shore of a lake 1 mile (1.6 km) southwest of the western end of Rope Lake. Very small irregular exposures are also in the northeastern part of the map-area where the Geraldton-Terrace Bay road crosses Kamuck River.

They are black, dense, massive, fine- and medium-grained rocks. As noted in hand specimen, they evidently have been recrystallized. The outcrop on the southern shore of Northline Lake shows a rough, pitted, vesicular surface. The rocks are all characterized by a high amphibole content and may be grouped as plagioclase amphibolite, olivine amphibolite, and pyroxene amphibolite. The plagioclase amphibolite contains plagioclase but neither olivine nor pyroxene is present. A sample contains: plagioclase, 64 percent; quartz, 5 percent; hornblende, 25 percent; biotite, 5 percent; and accessory zircon, apatite, and opaque minerals. This rock is massive, but there is a foliated type containing only a trace of plagioclase, the rest being hornblende. The pyroxene amphibolite consists of hornblende,

45 percent; clinopyroxene, 45 percent; biotite, 5 percent; quartz, 1 percent; calcite, 1 percent; and accessory plagioclase, apatite, and opaque minerals. The olivine amphibolite occurs both in irregular masses and in one dike. The rock consists of tremolite, 68 percent; poikiloblastic olivine (hyalosiderite, by X-ray diffraction determination), 30 percent; an indeterminate isotropic mineral, 1 percent; and accessory serpentine and opaque minerals.

MIGMATITES

Migmatites form quantitatively the most significant unit and represent the granitization of greywacke, arkose, and arenite. Foliate and gneissose structures are abundant and the name migmatite is used to indicate the intimate association of metamorphosed country rock and granitic, pegmatitic, or aplitic veins and bands. The foliate-gneissic structure occurs in various degrees of perfection; in some outcrops it is easily observed and measurable, in others only ghost-like relics of the former metamorphic structure are apparent. Complex plastic folding of the component units of the migmatites has occurred. The unit was outlined and mapped primarily on its structural appearance: remnants and layers of metasediments interbanded with granite, pegmatite, or aplite.

The metasedimentary migmatite unit is subdivided on the basis of the nature of the leucosome as proposed by Mehnert (1968, p.232). This method has been adopted here as it is also useful in the preparation of a lithological map. At any given outcrop the two components may always be seen and as the variable is the granitic component, it is thus possible to indicate both facies. The felsic component is referred to as the leucosome to avoid genetic implications and this can be of granitic, pegmatitic, or aplitic composition. Either one or all of these rock types may be present in a single outcrop but only the dominant facies is indicated.

The migmatites may contain minor garnet, tourmaline (schorl), or biotite. The leucosome weathers white and this is its most obvious characteristic. Ferromagnesian minerals are minor. A noteworthy feature is the increase in biotite content towards the northwestern part of the area. Here the biotite is in books about ½ inch (1.3 cm) across. The migmatite phenomena are unequivocally apparent where greywacke is migmatized. In the southeastern part of the map-area, where arkose and arenite are migmatized, the phenomena are more subtle. However, the banding of the arenaceous sediments can still be seen. As both the sedimentary and granitic fractions are leucocratic, careful field examination is necessary to identify the phenomena. Photos 1 to 6 show the various types of interpenetration structures that can be seen in the field.

FELSIC IGNEOUS ROCKS

These rocks occur mostly as oval-shaped masses elongated in the direction of the structural trend, i.e. northeastward. They comprise about 40 percent of the exposed rock of the map-area. They vary in length from 1 mile to 9 miles (1.6 to

Dickison Lake Area

ODM8845

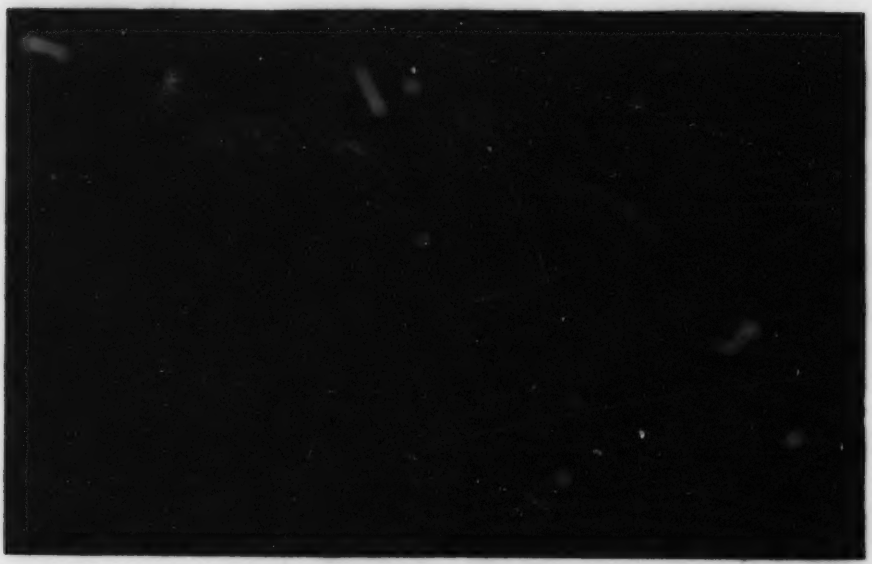
Photo 1–Metasedimentary migmatite: dark material (melanosome), biotite-quartz-feldspar gneiss; light material (leucosome), granite-pegmatite; 1 mile northwest of Toupee Lake on Statesman Road. Note sigmoidal form of gneiss.

ODM8846

Photo 2–Ptygmatic vein of aplite in migmatite, Terrace Bay-Geraldton Road near Ukelele Lake.

ODM8567

Photo 3–Nebulitic structure in migmatite. Tight kink folds barely visible in granitized gneiss. Gravel Lake.



ODM8568

Photo 4–Dilatation structure in migmatite. Boudins of granitic and pegmatitic material in metasedimentary biotite-quartz-feldspar gneiss. Note flowage of incompetent gneiss material into 'necks' of boudins. Statesman Road, ¼ mile west of Terrace Bay-Geraldton Road.

ODM8869

Photo 5–Layered structure in migmatite. *Lit-par-lit* migmatite, leucocratic granite and granite-pegmatite bands in biotite-quartz-feldspar gneiss. Note continuity of discordant and concordant dike material. Lake, ½ mile west of Gravel Lake.

ODM8870

Photo 6–Complex fold structure in migmatite. Boudinage structure in the broader leucocratic bands, lower left part of photo. Statesman Road, 1 mile northwest of Toupee Lake.

14.4 km) and in width from ½ mile to 5 miles (0.8 to 8 km). The rocks are massive, equigranular, and medium to coarse grained. Except for an outcrop which straddles the Gravel River-Kamuck River Fault and is north of Dickison Lake, all masses have gradational contacts with the enclosing migmatite or greywacke. The body north of Dickison Lake is in part porphyritic and shows clear intrusive contact phenomena with the surrounding rocks. Included among the felsic igneous rocks are granitic pegmatites and granitic aplites.

The most common variety of felsic igneous rock is a pale white granite which also weathers white. It is quantitatively the most important unit and is well exposed in the northwestern, northern, and eastern parts of the map-area. Biotite is the only mafic mineral present. A typical specimen of this rock type consists of 49 percent quartz, 50 percent feldspar, and 1 percent biotite. Potassic feldspar, which amounts to 49 percent of the total feldspar content, consists of microcline with minor perthite and sericitized orthoclase. The plagioclase (albite-oligoclase) is also sericitized. Most of the felsic minerals show undulose extinction due to strain. In some areas granite may be pink and crossed by veins with pockets and vugs containing amethyst, e.g. at Kabamichigama Lake.

The next most abundant member is a hornblende or hornblende-biotite granite. This rock is most important in the south-central and southwestern parts of the map-area. The characteristic feature is its pink colour and the occurrence of subhedral to euhedral hornblende. Biotite, when present, is always subordinate to hornblende. A thin section cut from a typical example of the hornblende-biotite variety indicates a composition of 20 percent quartz, 62 percent feldspar, 10 percent common green hornblende, and 5 percent biotite with accessory sphene, zircon, and opaque minerals. The alkali and plagioclase feldspars are equal in amount, with the potassic feldspar comprising mainly microcline, being less abundant than orthoclase and perthite. The plagioclase is albite-oligoclase. Most of the felsic minerals show undulose extinction due to the effects of strain. Peripheral granulation of some of the quartz and feldspar grains can also be seen.

White granite-pegmatite and granite-aplite are associated with the granite and quartz monzonite. These rocks may contain pink garnet up to 2 percent, books of biotite up to 1 percent which may measure ¾ inch (2 cm) across, and minor tourmaline, occurring as the variety schorl. These accessory minerals become particularly abundant as the northwestern boundary of the map-area is approached. Small bodies of metasediments may also be observed in the granite and quartz monzonite and are regarded as xenoliths or metasedimentary relics representing an arrested stage in the granitization process.

In the southeastern part of the area, about Northline Lake, a leucocratic fine- to medium-grained biotite granite occurs. This body is not quantitatively important but is significant in illustrating the process of granitization of arkose where the two rock types are seen in intimate contact farther to the east, east of Northpine Lake, i.e. in the migmatite east of the Greenhedge Lake-Southpine Lake Fault.

The only body showing unequivocal intrusive relationships with its enclosing rocks is a pink medium-grained and, in places, porphyritic rock containing a characteristic golden coloured mica. The mass is 7 miles (11.2 km) long by ½ mile (0.8 km) wide and is well sheared in the vicinity of the Gravel River-Kamuck River Fault. It is a muscovite granite consisting of 25 percent quartz, 77 percent feldspar, 5 percent muscovite pseudomorphic after biotite, 2 percent iron minerals, and a trace of chlorite. Alkali feldspar, comprising 72 percent of the total feldspar content,

is microcline associated with less abundant perthite. The plagioclase makes up 5 percent of the rock and is sericitized. Thin section study shows that what appears to be muscovite in the field is actually bleached biotite, the grains of which are always surrounded by granular iron oxide minerals.

East of Roslyn Lake there is a magnetite-rich mass consisting predominantly of coarse pink granite-pegmatite, and measuring 9 miles (14.4 km) long by 2½ miles (4 km) wide at its widest point. The important feature of this body is the ubiquitous occurrence of magnetite, which can constitute up to 40 percent of the rock. The pegmatite is virtually free of ferromagnesian minerals and may be unusually coarse grained in places. The magnetite occurs either as bands ½ inch (1.3 cm) wide or as well formed crystals up to 1 inch (2.5 cm) in diameter. This occurrence of magnetite is responsible for the magnetic anomaly associated with this mass.

Late Precambrian (Proterozoic)

DIABASE DIKES

Diabase occurs in the area as dikes and as a lensoid mass but is quantitatively insignificant. The diabase occurs in three habits: (1) parallel to and emplaced in the major northwest faults in the area; (2) parallel to the main lineament trends, i.e. northeast, north, and east; and (3) as a lensoid mass parallel to the northeast trend of the Gravel River-Kamuck River Fault. The tabular dikes range in width from 5 to 20 feet (1.5 to 6 m) but only where they occur in the major northwest faults, e.g. the Eastbourne Lake-Hall Lake Fault and in the Croon Lake-Dinkin Lake Fault, do they reach 20 feet (6 m) in width (e.g. at Dinkin Lake). The largest mass occurs as a northeast-trending lens ½ mile (0.8 km) south of the western end of Kamuck Lake where it is ¾ mile (1.2 km) long by ¼ mile (0.4 km) wide. However, the diabase occurs in the faults only intermittently along their lengths. The largest continuous exposure of these dikes is at Dinkin Lake where a dike extends over a distance of 1 mile (1.6 km). Along the major faults the diabase is massive or sheared, but shows very fine grained or chilled margins against the enclosing country rocks. Thus the diabase, although being later than the earliest (northwest) faults, was also ruptured by later movements along the faults.

It is significant that diabase has not been emplaced along the northeast-trending Gravel River-Kamuck River Fault. The age of the diabase is therefore regarded as pre-Gravel River-Kamuck River Fault. If the diabase is Proterozoic then this major fault is younger than the Precambrian. It may also be observed that the diabase is highly mineralized where fractured. It therefore also serves to date the period of mineralization. Here again no mineralization is associated with the Gravel River-Kamuck River Fault.

The diabase is similar where it is unaltered. It is a dark, massive, medium-grained rock displaying ophitic texture on its weathered surfaces. In thin section medium labradorite and clinopyroxene are the dominant minerals, arranged in subophitic texture. Other minerals are quartz, comprising 1 percent, a micropegmatitic mesostasis amounting to 2 percent, and accessory brown biotite, chloritized brown bio-

tite, and opaque minerals. Where the rock is altered by shearing, the original texture is still observable, but the quartz content is 3 to 5 percent. This increase in the quartz content of the rock is considered to result from alteration of the primary ferromagnesian and plagioclase minerals. Thin section examination of the dark shattered rock in the faults proves that it is the same diabase.

Cenozoic

QUATERNARY

Pleistocene and Recent

Pleistocene deposits consisting of unconsolidated gravel, sand, and silt cover much of the area along its northern and eastern borders and along the Gravel River, south of the Gravel River-Kamuck River Fault, in the southwestern part of the map-area. The deposits are ground moraine, glaciofluvial, and glaciolacustrine sand and gravel.

Ground moraine is most widespread although patchy. It consists of an unsorted mixture of pale grey, yellow weathering sand with a large amount of boulders and gravel. In the north-central part of the area, especially between the upper section of Roslyn Lake and Toupee Lake, but also farther eastward as well, the material consists of fine yellow, clayey sand. It forms low flat terrain.

Glaciofluvial deposits, on the other hand, occur as sinuous eskers consisting of gravel and sand. One ridge, approximately 1 mile (1.6 km) long, is located 1 mile (1.6 km) north of Upper Roslyn Lake and another of similar length occurs along the north bank of Southern Creek east of Lawyer Lake. This latter ridge appears to be part of the longest esker, 2 miles (3.2 km) in length, which extends from Southern Lake northeastward to Ambassador Lake which is just north of the map-area. All the eskers are in the north-central part of the map-area and trend southwestward.

Glaciolacustrine deposits consist of fine whitish sand and form a narrow fringe on the southern shore of McKnight Lake at the north-central boundary of the map-area. The largest deposits, however, are along the Aguasabon River south of Kamuck River in the eastern part of the map-area, and along Gravel River south of the Gravel River-Kamuck River Fault. These are deltaic and gravel valley-train deposits (Zoltai 1965); crossbedding was observed in the Aguasabon deposit. The Gravel River material has been cut into a series of broad flat terraces which can be well seen from the air.

Large boulders are scattered throughout the area on the less elevated regions as perched blocks. Examination of these indicate that they have not been transported far as they are similar to the underlying bedrock types.

Glacial striae have been observed in outcrops at the shores of Foam Lake, Lacrosse Lake, Porcelain Lake, Tonimac Lake, and at an unnamed lake 1 mile (1.6 km) west of Chance Lake. The direction of the striae is southwest, varying from S10W to S25W. There directions are on the average the same as those of the esker ridges.

Dickison Lake Area

Recent deposits comprise scree material, well developed at the foot of the Gravel River-Kamuck River fault scarp especially north of Dickison Lake; muskeg in open swamps; and sand and gravel along some of the rivers.

STRUCTURAL GEOLOGY

Folding

It was not possible to establish the pattern of folding in the area because of the absence of primary bedding features in the greywacke unit. Although foliation is well developed, it was not possible to say whether it is bedding plane foliation and it could not therefore be used in place of bedding to determine structure. The greywacke unit at Dickison Lake is the only extensive unit of unmigmatized sedimentary rock. This remnant grades towards the southeast into migmatized greywacke and, where the process of migmatization was found to have been well advanced, a regimen in which ptygmatic folding and micro-folding of country rock has been developed was noted. However, no consistent pattern of folding was established.

Foliation, Gneissosity, and Shearing

The region is characterized by well-developed foliation, gneissosity, and shearing. These features are best displayed in the Dickison Lake area; foliation and shearing in the region bordering Dickison Lake on the north, and gneissosity in the transition zone to the south bordering on the migmatite region.

Foliation is best developed in the greywacke unit and is marked by the parallel orientation of the biotite. Only in the amphibole schists does the orientation of hornblende serve to indicate the foliation. When highly developed, this orientation imparts a schistosity to the rock masses but it is not uniformly developed.

Gneissosity is likewise marked by the orientation of mica and amphibole, the former being the more important. It is present where the greywacke has been migmatized, producing either a homogeneous rock or one in which migmatitic banding is apparent.

The average regional trend of the foliation and gneissosity is east-west and can be observed in areas away from the vicinity of faults. Minor deviations from this average trend are west-northwest and east-northeast. As the major faults are approached, the regional direction is distorted; thus in the neighbourhood of Dickison Lake the foliation has a direction parallel to the Gravel River-Kamuck River Fault and the trend is then northeastward. Similarly, in the southeastern part of the area the foliation is parallel to the Aguasabon River, i.e. a northwestward trend. The dip of the foliation and gneissosity is steep to vertical.

Shearing is best developed in the greywacke between Dickison Lake and the Gravel River-Kamuck River Fault. It forms a zone grading into mylonite in the vicinity of the fault itself. The shearing is associated with all the main faults of

the area. The principal directions of shearing are northeast and northwest. It is characterized by the development of steeply dipping cleavage planes or S-planes on many of which slickensides can be seen. The rock is broken up into a friable mass of lozenges or angular masses of breccia. The S-planes are seen to cut the original foliation of the rocks in many places but they are also commonly found to be parallel. The change in the direction of the regional foliation or gneissosity in areas of shearing to parallel that of the faulting and shearing, and the fact that shear planes cut the foliation, indicate that shearing was later than the development of the foliation and gneissosity.

Fracturing and Faulting

A marked feature in the map-area is the presence of a large number of straight or curvilinear lineaments. These are well observed on aerial photographs and reflect faults, shears, and joints. Only the more important ones are shown on the map. Where the nature of a lineament could not be ascertained, it is shown as a lineament on the map. The most numerous of the lineaments form a conjugate northwest- and northeast-trending system with the northwest-trending set being the better developed. In addition, there is a north-south-trending set as well as an east-west-trending set.

The most important northwest-southeast lineaments are the Eastbourne Lake-Hall Lake lineament, the Sinclair Lake lineament, the Croon Lake-Dinkin Lake lineament, the Greenhedge Lake-Southpine Lake lineament, and the Little Aguasabon River lineament. These lineaments all show shearing and(or) slickensides throughout most of their lengths and are therefore classed as faults. The north-south trend is best developed in the area to the northwest of the Gravel River-Kamuck River feature and may be emphasized by large elongated lakes, e.g. Weatherall Lake.

A feature of regional importance is the northeast-southwest-trending Gravel River-Kamuck River lineament which divides the map-area symmetrically. It is 34 miles (55 km) long within the map-area and has a marked physiographic expression, that of a steep-walled trench up to 200 feet (60 m) wide. This lineament is associated with a mylonite and phyllonite zone about 1 mile (1.6 km) wide. Only in the area close to the lineament, at Spine Creek and Spine Lake, are there parallel lineaments, e.g. the lineament connecting the two lakes about ¾ mile (1.2 km) to the southeast of Spine Creek and Spine Lake. Because of features associated with the Gravel River-Kamuck River lineament as described below, it is classed as a fault.

Well-developed slickensides with a rake of 50 degrees to the northeast are on the northwestern wall of the fault and indicate north wall down. This accords with evidence available from examination of the aeromagnetic contours on both sides of the fault. A marked aeromagnetic discontinuity is readily apparent at the fault and this is reflected in the contrasting lithology. The area southeast of the fault is characterized by greywacke and migmatite, the latter containing a high proportion of the palaeosome and magnetite; the area northwest of the fault, by migmatite comprising mainly white granite-pegmatite with little or no palaeosome.

A minor but chronologically significant lineament direction is a north-northwest

trend which is in the northeastern part of the map-area about 2 miles (3.2 km) north of Chorus Lake. A set of lineaments parallel to this trend offsets the Gravel River-Kamuck River Fault and as the latter is displaced between two lineaments and still maintains its own trend, these lineaments are regarded as faults.

The attitudes of the northwest-southeast faults could not be determined by direct observation but if these faults are considered to be one continuous set, then with a north wall down movement on the Gravel River-Kamuck River Fault it may be inferred that the Eastbourne Lake-Hall Lake and Sinclair Lake Faults, on the one hand, and the Croon Lake-Dinkin Lake and Greenhedge Lake-Southpine Lake Faults on the other, dip towards each other. This is so inferred because the two faults to the northwest of the Gravel River-Kamuck River Fault 'enclose' the projected traces of the two faults to the south of the Gravel River-Kamuck River Fault. In view of the mineralization observed along these two northwest-trending faults, their down-dip intersection beneath the surface could be of economic significance.

All the faults described are post-migmatite and post-granite in age and movement on the two northwest faults just mentioned is also post-diabase. Examination of the physiographic expression of these two northwest-trending faults shows that they are both displaced by the Gravel River-Kamuck River Fault. This indicates that the latter is the younger. The youngest set of faults would then be the north-northwest faults occurring in the northeastern part of the map-area as these displace the Gravel River-Kamuck River Fault. Diabase dikes with chilled margins were emplaced in some of the northwest-trending faults, e.g. the Croon Lake-Dinkin Lake Fault. The Dinkin Lake diabase has been brecciated by movement along the fault however, indicating that some post-diabase fault movements occurred.

A systematic study of jointing was not carried out but master joints are well developed in the greywacke unit in the Dickison Lake area. Their trend is consistently north-northwest, the same direction as the joints in the migmatites.

ECONOMIC GEOLOGY

Economic interest in the area derived from its considered geological similarity to the Manitouwadge area about 75 miles (120 km) to the east. The staking rush in that area early in 1954 stimulated active exploration in the map-area. Interest at first centred primarily on the unmigmatized remnant of metasediments exposed at Dickison Lake. Thus in 1954, Canadian Pacific Limited prepared a geological map of the area around Dickison Lake as a basis for mineral exploration. A similar study was made by the same company in 1955 of a contiguous area to the southwest containing part of the Gravel River. In 1970, Dome Mines Limited examined the sulphide showings in the greywacke at Dickison Lake. Beginning in 1968, emphasis was placed on the examination of the major faults in the area as possible zones of copper mineralization. Thus in 1968, Anglo American Nickel Mining Corporation Limited carried out exploratory drilling to test copper showings near the north shore of Kabamichigama Lake in the vicinity of west Gravel River. At this point the Eastbourne Lake-Hall Lake Fault crosses the lake and river and the fault encloses a brecciated diabase dike. In the next year, 1969, prospectors were actively examining the Croon Lake-Dinkin Lake and the Greenhedge Lake-Southpine Lake Faults.

At Dinkin Lake, where exploration activity was concentrated, a brecciated diabase with pyrite mineralization is in the fault, but no diabase is in the Greenhedge Lake-Southpine Lake Fault. The most thoroughly examined part of this fault is in the vicinity of Chapman Lake where four copper deposits have been located.

Amethyst was being mined at the Little Bear Mine at Kabamichigama Lake where a small production was being maintained. The amethyst is recovered from a 200-foot (60 m) long breccia zone in pink biotite granite.

The mineral deposits in the area can be classified under the headings amethyst, base metal-copper sulphide, molybdenite, and pyrite occurrences. The amethyst occurrence is characteristic of a high-level deposit and is found in vugs in a zone of brecciated biotite granite. It is located at Kabamichigama Lake on the Galarneau Property (3). The base metal sulphide, molybdenite, and pyrite deposits are associated with quartz gangue in sheared and brecciated diabase or country rock and granite-pegmatite. Chalcopyrite-pyrite-bornite mineralization in brecciated diabase is exemplified by the Nolan Cox Deposit (1) at Kabamichigama Lake where a diabase dike emplaced in a fault has been brecciated and cemented with quartz. The iron and copper sulphides are in irregular disseminated patches in both the quartz and altered diabase. Examples of copper sulphide deposits in shear zones are those along the Greenhedge Lake-Southpine Lake Fault. Molybdenite occurs as disseminated traces in greywacke or granite-pegmatite at Dickison Lake and along a road about 1 mile (1.6 km) southwest of Chorus Lake. Pyrite is in shear zones; the deposit at Dinkin Lake is the most important. Here pyrite is in a brecciated diabase which had been intruded into a fault. The brecciated diabase was then cemented with quartz. North of this deposit, in the vicinity of Dickison Lake, pyrite by itself is in narrow shears in migmatite and granite.

Recommendations for Future Exploration

A characteristic feature of the region is the large number of faults and lineaments. Examination of the distribution of the known showings reveals a close spatial relationship between mineralization and faults. Thus, in the southeastern part of the map-area, the showings of copper and iron sulphide minerals are along the Greenhedge Lake-Southpine Lake Fault. In addition, the most important base metal mineral occurrence is associated with the Eastbourne Lake-Hall Lake Fault at Kabamichigama Lake on the Nolan Cox Property (1). There are diabase dikes in some of the faults, e.g. the Croon Lake-Dinkin Lake Fault and the Eastbourne Lake-Hall Lake Fault. In both of these faults, at Dinkin Lake and at Kabamichigama Lake, respectively, the diabase is brecciated and cemented with quartz. At Kabamichigama Lake, the diabase has chalcopyrite and pyrite-chalcopyrite whereas at Dinkin Lake it has only pyrite. At Chapman Lake, there is no diabase at all. This indicates the importance of considering the time factor in relation to the structural event when investigating areas of mineralization. Thus, there may either have been two periods of mineralization, pre- and post-diabase, or one post-diabase. The time factor is further emphasized by the observation that the major fault of the area, the Gravel River-Kamuck River Fault has no sulphide mineralization. As this fault has been shown to be later than the northwest faults and therefore post-diabase, the latest period of mineralization is post-diabase and pre-Gravel

River-Kamuck River Fault. Therefore, mineral exploration should be confined to northwest-trending faults. The importance of the faulting to mineral exploration has earlier been referred to by Pye (1970, p.19).

A further refinement for locating the most favourable areas along the post-diabase faults is the search for intersections of northwest-trending faults with conjugate northeast-trending faults. These faults are probably contemporaneous. In illustration of this, a study of the Dickison Lake area map with the contiguous map to the west (Pye 1965) is significant. The northwest extension of the mineralized Croon Lake-Dinkin Lake Fault into the Georgia Lake area intersects the fault following Glacier Creek near an unnamed lake northeast of the South Bay of Barbara Lake, about ½ mile (0.8 km) west of the Dickison Lake map-area. The Glacier Creek Fault is known to be mineralized; the Kagiano Mines Limited copper showing (Company report in the Resident Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay), and the Potter copper deposit (Pye 1965) are along it. The former showing is not exactly at the intersection and it is recommended that the actual area of intersection, about ½ mile (0.8 km) north of the showing along the Glacier Creek Fault, be examined.

In summary, it can be said that copper mineralization is the most important type of base metal mineral occurrence in the area and the most favourable localities are at the junction of northwest- and northeast-trending faults. Inasmuch as northeast-trending faults are better developed to the west of the Dickison Lake area and northwest-trending faults are better developed in the Dickison Lake area, the most favourable locality should be in the vicinity of the boundary between the two areas. Because of the time factor, the mere intersection of two faults is not a sufficient condition for mineral localization. Intersections of faults formed at or before the time of mineralization must be sought. It is therefore believed that a detailed structural analysis of the faulting would be an important aid to mineral exploration in the area.

Description of Properties, Prospects, and Occurrences

AMETHYST

T. GALARNEAU (3)[1]

The properties held in 1970 consisted of a group of three unsurveyed contiguous claims, TB222598, TB277596, and TB277597, north of Kabamichigama Lake near Arrell Lake, and an unsurveyed claim, TB221751, situated 2 miles (3.2 km) west of the northern tip of Weatherall Lake.

Bedrock on the first group of claims consists of pink biotite granite bordered on the eastern part of the property by metasedimentary migmatite.

[1]Number in brackets refers to property number on Map 2293, back pocket.

The economic feature consists of a vuggy breccia zone striking N65W, 1 foot to 3 feet (0.3 to 0.9 m) wide, and dipping 73 degrees southwest. The zone is about 200 feet (60 m) long and consists of brecciated pink biotite granite cemented with pink to purple amethyst and containing elongate vugs measuring up to 2 feet (60 cm) long by 6 inches (15 cm) wide, and lined with pink quartz and amethyst. The vein amethyst occurs as ramifying veinlets ½ inch to 1 inch (1.3 to 2.5 cm) wide along the brecciated zone. Crystals of amethyst up to 3 inches (7.6 cm) long have been recovered from the vugs. The vein structure is entirely in the pink biotite granite. Amethyst is being produced but no production figures are available.

No work was recorded for claim TB221751 located west of Weatherall Lake. This area is underlain by metasedimentary migmatite.

BASE METAL SULPHIDE DEPOSITS

Copper

CHAPMAN LAKE COPPER OCCURRENCES

Considerable prospecting work has been done in the region around Chapman Lake. The most important showing is located on the eastern side of the Greenhedge Lake-Southpine Lake Fault between Flicker and Chapman Lakes. It consists of disseminated chalcopyrite in a quartz body about 200 feet (60 m) long and 50 feet (15 m) wide located in the fault. The attitude of the body could not be determined but its long axis is in the direction of the fault. The quartz contains about 5 percent chalcopyrite, and malachite is on the surface of the quartz. There are two other copper showings in this area. These consist of traces of pyrite and chalcopyrite in the fault zone. A further occurrence of chalcopyrite along this fault is situated about 1 mile (1.6 km) south of Chapman Lake on the eastern shore of Northpine Lake. This showing consists of a quartz vein 1 foot (30 cm) wide in sheared grey biotite leucogranite containing 1 to 2 percent chalcopyrite as disseminated grains up to ¼ inch (0.6 cm) across.

N. COX (1)

This property consists of a group of 12 contiguous unsurveyed claims held in 1970. They are located at the northern shore of Kabamichigama Lake in the lower reaches of West Gravel River and comprise claims TB133729 to TB133740.

The property is underlain by massive biotite granite and migmatite cut by a diabase dike, itself brecciated and emplaced in the Eastbourne Lake-Hall Lake Fault which crosses the property. The diabase dike is about 5 feet (1.5 m) wide and strikes N60W. Sulphide mineralization consisting of pyrite, chalcopyrite, and minor bornite, is associated with the diabase dike which is fractured and cemented with

quartz. The fracture zone dips steeply to the northeast. The chalcopyrite is in irregular patches associated with both diabase and quartz but it is more common in the former. The occurrence was initially discovered during road construction work in 1967 (Northern Miner 1968a, p.551) and subsequent surface exploration in that year revealed mineralized parts of the breccia zone over a strike-length of 800 feet (240 m) with widths of 8 to 17 feet (2.4 to 5.2 m) (Northern Miner 1968a, p. 541). Magnetic and electromagnetic surveys were carried out in 1968 on the property which was optioned to Anglo American Nickel Mining Corporation Limited in 1968 (Northern Miner 1968a), p. 541). The magnetic survey indicated two anomalies 900 feet (274 m) and 600 feet (183 m) long respectively, and the electromagnetic survey outlined an anomalous zone for a strike-length of 4,000 feet (1220 m) (Northern Miner 1968b, p. 591). Diamond drilling was carried out in 1968 by the same company on claim TB133730. One hole intersected 87 feet (26.5 m) of copper mineralization averaging 1 percent Cu over 19 feet (5.8 m) (Northern Miner 1968c, p.657); a second hole intersected 57 feet (17.3 m) of copper mineralization grading 0.54 percent Cu (Northern Miner 1968d, p.740). The logs of these holes are filed in the Resident Geologist's Files, Ontario Ministry of Natural Resources, Thunder Bay.

GREENHEDGE LAKE COPPER OCCURRENCE

This occurrence consists of disseminated chalcopyrite in the biotite bands of biotite-quartz-feldspar schist. The occurrence is in a 6-inch (15 cm) wide shear associated with the Greenhedge Lake-Southpine Lake Fault. The shear is in migmatite that consists of schist and gneiss and granite-pegmatite. The chalcopyrite amounts to about 1 percent in the biotite bands.

Molybdenum

Molybdenite was observed in two areas, on the north shore of Dickison Lake and at a roadside exposure approximately 1 mile (1.6 km) south-southwest of Chorus Lake. Both these occurrences are impregnations in the country rock.

DICKISON LAKE MOLYBDENITE OCCURRENCE

This occurrence consists of traces of disseminated molybdenite in phyllonitic greywacke. Pyrite is associated with the molybdenite.

CHORUS LAKE MOLYBDENITE OCCURRENCE

This occurrence is at a roadside outcrop about 1 mile (1.6 km) south-southwest of the Chorus Lake bridge on the west side of the road. It consists of traces of molybdenite in granite-pegmatite bands 1 inch to 3 inches (2.5 to 7.6 cm) wide in metasedimentary migmatite.

Pyrite

The most important pyrite occurrences are at Dinkin Lake and along faults and shears, 1 mile to 2 miles (1.6 to 3.2 km) northeast of Dickison Lake.

DICKISON LAKE PYRITE OCCURRENCES

These occurrences are associated with narrow shears in granite and migmatite. The Spine Creek deposit is in a shear on the north wall of the Gravel River-Kamuck River Fault. The pyrite is in cubes up to ½ inch (1.3 cm) across in fault gouge and very fine grained chloritized rock material in the shear. About ½ mile (0.8 km) southeast of this occurrence, at either end of an unnamed lake, pyrite is on shear planes in mylonized granite reddened with hematite. The pyrite occurs as cubes ¼ inch (0.6 cm) across in the granite, and the pyrite content is about 2 percent.

DINKIN LAKE PYRITE OCCURRENCE

This pyrite deposit is in the bluff on the western shore of Dinkin Lake. The pyrite is in a fine grained brecciated diabase that was intruded into the Croon Lake-Dinkin Lake Fault. The diabase contains about 40 percent pyrite across a width of 3 feet and along a strike-length of ¾ mile. Pyrite occurs as disseminated grains in the diabase and in the quartz that cements the diabase fragments.

MISCELLANEOUS PROPERTIES

E. S. DAMPIER (2)

In 1970, E. S. Dampier held an unsurveyed claim, TB222877, north of Kabamichigama Lake near Arrell Lake. The region is underlain by granitic rocks. No work had as yet been done on the claim.

A. HARDY (4)

As of 1970, this property consisted of a group of nine contiguous unsurveyed claims numbering TB221437 to TB221445. Only four of these, numbers TB221441 to TB221444, are in the map-area. These claims are in the extreme southwestern part of the map-area about 2 miles (3.2 km) west of Gravel River. The region is underlain by pink hornblende-biotite granite. No work was recorded for the property in 1970.

Dickison Lake Area

P. T. O'CONNOR (5)

A group of 21 contiguous unsurveyed claims, TB136543, TB136546, TB136548-TB136556, TB136558 to TB136560, and TB137323 to TB137329 were held by P. T. O'Connor in 1970. The property is located in the extreme northwestern part of the map-area. The claim group is underlain by white and pink pegmatite with minor aplite and traversed by the northwest-trending Croon Lake-Dinkin Lake Fault at its southern border. Here brecciated diabase is in the fault. At the northwestern shore of Croon Lake, the diabase outcrop is brecciated and mineralized with pyrite. Electromagnetic and magnetic surveys were carried out on the property and diamond drilling has been done. The results of the exploration work however were not available at the time of the writing of this report.

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